Om Tiwari

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Education

Master of Science - Computer Science(Master's degree), 10/2021 – present
Technische Universität Kaiserslautern(RPTU) Kaiserslautern, Germany

Bachelor of Technology in Computer Science [German equivalent- 1.8], 08/2016 – 09/2020
Krishna Engineering College New Delhi, India

Skills

Programming Languages&Skills: Python | C/C++ | ROS | Linux(Ubuntu) | Git/Github | Nav2 | MoveIt | FlexBE | SLAM | Object Detection | Raspberry Pi | Nvidia Jetson | LLM API Integration | Gradio

Machine Learning Framework: NumPy | Pandas | Keras | TensorFlow | Pytorch | Multimodal Retrieval Vision-Language Models | LangChain and LangGraph | Retrieval-Augmented Generation (RAG) | Automatic speech recognition (ASR) | Whisper | NLP | Generative AI | Multimodal AI | Agentic AI

Automation & Simulation: Docker | Gazebo | MuJoCo | StableBaselines3 | Carla

Languages: German(B2 going on - willingness to learn C1) | English(C1 IELTS)

Work Experience

Hitachi Astemo, *Master Thesis* 01/2025 – 08/2025
Munich, Germany

- Integrated a **3D object detection** pipeline in **ROS2** with multi-camera and **LiDAR sensors**, troubleshooting stereo vision and LiDAR issues to ensure robustness and enhance detection **accuracy**.
- Conducted **software-in-the-loop (SiL) tests** using the CARLA simulator and **ROS 2 packages** to validate algorithm performance under various scenarios (lighting conditions, weather patterns, and road conditions).
- Developed an **end-to-end pseudo-LiDAR system in ROS2** using stereo vision within a **Docker-based Ubuntu environment,** unifying depth estimation and 3D object detection for **LiDAR-comparable accuracy.**
- Collaborated with developers to **fine-tune system parameters** and conducted statistical evaluations to propose enhancements that reduced **false positives by 30%**.

BOSCH, *Intern* 01/2024 – 06/2024
Renningen, Germany

- Spearheaded system integration to embed **foundational models into the Franka Panda cloth folding robot**, merging machine learning algorithms with precision control systems.
- **Set up, integrated**, and tested robotic systems in new environments while resolving impedance control bottlenecks to improve **manipulation efficiency.**
- Demonstrated expertise in **MoveIt and FlexBE** for collision-free motion planning and behavior design, while using **MuJoCo, RoboSuit, and Stable Baselines3 to refine rope manipulation** through iterative RL-based improvements.

Kaiserslautern Racing Team – KaRaT e.V, 11/2021 – 11/2022
Intern - Autonomous navigation (Formula E student) Kaiserslautern, Germany

- Integrated Tiny YOLO, SFA3D, and PointNet using **ROS on Nvidia Jetson, boosting detection and depth prediction by 3%**, and leveraged GNSS, inertial sensors, LiDARs, and stereo vision for precise **visual SLAM-based localization**.
- Applied deep understanding of **visual SLAM and ROS** to integrate tiny YOLO, SFA3D, and PointNet (LiDAR) on **Nvidia Jetson,** enhancing detection performance.

- Achieved a **10% improvement in detection** and depth prediction by integrating Tiny YOLO, SFA3D, and PointNet, and configured a DNN classifier reaching 95% accuracy on 5K self-driving images over 100 epochs.

Fraunhofer ITWM, *Research Assistant* 01/2022 – 09/2023
Kaiserslautern, Germany

- Implemented advanced deep learning models like PointNet++ for **urban scene understanding**, and synthesized research findings using analytical and visualization methods to **drive 40% innovation**.
- Implemented the **YOLOv4 algorithm for recognizing house** and window features in Kaiserslautern City Datasets, integrated with **DarkHelp C++ API to transfer coordinates in JSON format, optimizing processing speeds by 15%.**

Deutsches Forschungszentrum für Künstliche Intelligenz, *Research Assistant* 06/2021 – 06/2023
Kaiserslautern, Germany

- *Consolidated datasets from **NVIDIA Deep Learning Data Synthesizer to generate synthetic** data for training, increasing the accuracy of object detection by 5.1% mAP*
- *Enhanced object detection accuracy from 90.5% to 95.6% mAP through data augmentation & hyperparameter tuning of YOLOv4 algorithm with **acquired NDDS plugin of Unreal Engine synthetic data.***
- *Integrated ROS basics for completion of task navigation & devised a strategy for **message transfer from a robot to an external computer via MQTT protocol.***

Projects

Fashion Style Analyzer: Multimodal Vision-Language RAG System 06/2025 – 11/2025

- Built a **multimodal vision-language retrieval system** fashion analysis tool using **ResNet50 embeddings + cosine similarity** for image retrieval and **Llama 3.2 Vision** for catalog-style item descriptions.
- Implemented a modular pipeline (encoding → similarity search → item mapping → LLM generation) with complete **Gradio UI** for interactive fashion analysis.
- **Designed structured prompts** and post-processing logic to produce professional retail catalog outputs including item details, pricing, and alternatives.

MeetingMind AI : LLM-Powered Meeting Intelligence Platform 07/2025 – 09/2025

• Built an **LLM-powered meeting intelligence system** converting audio into structured minutes and actionable tasks using **ASR + multi-stage LLM pipelines**.
• Implemented **speech-to-text with Whisper** and **domain-aware terminology correction, summarization, and task extraction** via **prompt-engineered LLM workflows**.
• Delivered an **end-to-end interactive web app** with **Gradio**, enabling audio upload, real-time inference, and downloadable reports.

Publications

An experimental set up for utilizing convolutional neural network in automated weed detection, *4th International Conference on Internet of Things: Smart Innovation and Usages.(IEEE ISBN No. # 978-1-7281-1253-4)*

Intelligent Skin Cancer Detection Mobile Application Using Convolution Neural Network, *Journal of Advanced Research in Dynamical and Control Systems(international) Volume 11 | 07- Special Issue |Pages: 253-259*

Seminar

Safety Critical Multi-Modal-Object-Detection in Autonomous System, 06/2022 – 02/2023
(Seminar at Technical University of Kaiserslautern)

- Researched sensor data fusion techniques for multi-modal object detection in autonomous systems, **analyzing early and late fusion** methods for **LiDAR, radar, and camera data.**
- Provided insights into **state-of-the-art research on safety-critical** sensor fusion, emphasizing data-driven analysis and comparative results from **10+ papers.**